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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/529,257	04/11/2000	MASAKAZU ONIZUKA	1684/48707	5277

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EXAMINER	
LEUNG, JENNIFER A	

ART UNIT	PAPER NUMBER
1764	

DATE MAILED: 07/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/529,257	ONIZUKA ET AL.	
	Examiner	Art Unit	
	Jennifer A. Leung	1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 4* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 4* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendment submitted on April 22, 2004 has been received and carefully considered. Claims 2, 3 and 5-7 are cancelled. Claims 1 and 4 remain active.

Response to Arguments

2. Applicant's arguments filed on April 22, 2004 with respect to the rejection of claims 1 and 4 under 35 U.S.C. 103(a) as being unpatentable over Tamaru (JP 08-000950) in view of Johnson (US 2,931,580) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground of rejection is made in view of the newly found prior art references, below.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tamaru et al. (JP 08-000950) in view of Dijkstra (US 2,953,306) and Deering et al. (US 3,342,193).

With respect to claim 1, Tamaru et al. disclose a wet gas desulfurizing apparatus for absorbing the sulfur oxides of an exhaust gas with an absorption liquid ([Sections 0002-0003]), said apparatus comprising a branch pipe **12** of diameter **D** ([Section 0016], FIG. 3) for circulating an absorption liquid, said pipe **12** extending into a collection tank **4** and having an end which discharges absorption liquid into the collection tank (FIG. 1). Furthermore, Tamaru et al. disclose an air-blowing pipe **14** for injecting air into the pipe **12**, said air-blowing pipe having an end inserted into the pipe **12** at an insertion point (mixing point **13**). Tamaru et al. also

disclose the branch pipe **12** extends through a wall of the collection tank **4** (see FIG. 1) in order to discharge the circulating absorption liquid into the absorption liquid in the collection tank **4**.

Tamaru et al. are silent as to the air-blowing pipe **14** being inserted into the branch pipe at an insertion point **13** located between 3D and 10D from the discharge end of the pipe **12**. However, Tamaru et al. discloses that generating a "foam" by mixing the absorption liquid and air prior to injection improves the diffusion of air in the collection tank and, "it becomes possible to make it blow in into a liquid as a detailed foam also of a mass of gas," interpreted to mean that the foam is still present in the liquid upon reaching the discharge end of pipe **12** (machine translation; [Section 0008]).

Dijkstra (FIG. 3; column 5, lines 25-54) teaches an apparatus for dispersing a gas in the form of small bubbles within a body of liquid contained in a vessel (i.e., tank **5**; FIG. 1), said apparatus comprising a branch pipe (i.e., liquid supply pipe **10**) for circulating a liquid, said pipe **10** extending into a collection tank **5** and having an end (i.e., orifice **9**) which discharges liquid into the collection tank **5** (see FIG. 1). The apparatus further comprises a gas-blowing pipe (i.e., gas supply duct **6**) for injecting gas into branch pipe **10**, said gas-blowing pipe **6** being inserted into branch pipe **10** at an insertion point located at a distance "... preferably not over five times the maximum pipe diameter, back from the orifice **9** of a nozzle **18** which is fitted to the end of the liquid pipe **10**," (column 5, lines 25-31), thereby defining a short mixing chamber **17**.

It would have been obvious for one of ordinary skill in the art at the time the invention was made to locate the insertion point **13** in the apparatus of Tamaru et al. between 3D and 10D from the discharge end of the pipe **12** because "... the short mixing chamber **17** through which the mixture-stream flows before issuing from the orifice **9** brings the liquid into contact with the

gas so as to promote the disruption of the latter into small bubbles and the at least partial distribution thereof already before issue into the liquid body contained in the tank. It was found that with such an arrangement a considerably larger gas to liquid ratio and, at the same time, smaller bubbles can be obtained," as taught by Dijkstra (column 5, lines 35-43).

Dijkstra teaches the apparatus comprising an insertion point structured such that a central axis of the gas-blowing pipe **6** meets with a central axis of the branch pipe **10** at an angle, with the gas-blowing pipe **6** opening facing downstream (see FIG. 3). Additionally, Dijkstra teaches that for a similar embodiment, "While circular orifices were shown, it is evident that *other shapes* may be used," (column 5, lines 15-20); thereby indicating that the precise shape at the end of the gas-blowing pipe **6** is not absolutely critical to the functioning of the apparatus. The collective teaching of Tamaru et al. and Dijkstra, however, is silent as to whether the end of the air-blowing pipe may be configured specifically as a semicircular trough that faces downstream.

In any event, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to configure the end of the air blowing pipe **14** in the modified apparatus of Tamaru et al. in other suitable shapes (such as the instantly recited shape of a semicircular trough) on the basis of suitability for the intended use and absent showing any unexpected results thereof, because the precise shape of the opening selected for the air-blowing pipe is not critical to the generation of the bubble dispersion, as indicated by Dijkstra above, and furthermore, it has been held that changes in shape merely involves routine skill in the art. Also, the substitution of known equivalent structures, such as that illustrated by Deering et al., involves ordinary skill in the art. Deering et al. evidences a known apparatus for injecting one fluid into another fluid, the apparatus comprising an air-blowing pipe (i.e., conduit **3**, nozzle **1**; FIG. 1;

column 4, lines 15-30) that is inserted transverse to a fluid stream flowing through a vessel, such that its opening (i.e., aperture **5**) faces downstream. Deering et al. (column 4, line 65 to column 5, line 29; FIG. 4, 5) teaches that aperture **5** can be of any shape, and is typically of circular cross section. The aperture **5** may also comprise an axially elongated aperture, such as a rectangular slot having rounded ends, wherein the width of the aperture may be cut to about one-half the circumference of the conduit **3**, thereby inherently defining an air-blowing pipe having a "semicircular trough facing downstream".

With respect to claim 4, Tamaru et al. disclose that the interior diameter **d** of the air-blowing pipe **14** may be changed with changes in the flow rate through pipe **12**, and further disclose a specific diameter **d** in the range of 0.3D to 0.7D (substantially the recited range of 0.4D to 0.7D), where D is the diameter of pipe **12**. Numerical ranges that overlap prior art ranges were held to have been obvious.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 8:30 am - 5:30 pm M-F, every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jennifer A. Leung
July 11, 2004

Hien Tran

HIEN TRAN
PRIMARY EXAMINER